Cyclotron

NSD 88-Inch Cyclotron

Procedure

Title:	PIT SEARCH AND SECURE PROCEDURE		
Procedure Number:	Revision:	Revision Date:	Page
88-PRO-005	REV. 2.0	1 June 2006	1 of 4

Updated by Date	Approved by Date
Name Jim Morel	Name Jeff Bramble
Title Operations Supervisor	Title Radiological Control Technician
Approved by Date	Approved by Date
Name Dennis Collins	Name Claude Lyneis
Title Safety Committee Chairman	Title Program Head

1.0 PURPOSE

In general the search and secure (SAS) procedure is to have a searcher methodically search the Cyclotron Pit to look for people, hazardous conditions and to check the operational readiness of equipment. Once the searcher has verified that the Pit is ready for operation, then the searcher will secure the Pit to prevent anyone from reentering the Pit.

The intent of this procedure is to ensure that, when the Cyclotron and/or its Radio Frequency System (RF System) are operating, the Cyclotron staff and visitors are excluded from the Cyclotron Pit, thereby protecting them from prompt radiation in the Pit.

The scope of this procedure includes having the searcher physically closing the Cyclotron Pit, searching the Pit to ensure no one remains in the Pit, and inspecting the Pit to ensure it appears ready for safe Cyclotron operation, and then the searcher leaves and secures the Pit. , and finally the searcher logs the result of the search in the Cyclotron Operation Logbook in the Control Room.

If the Operator in Charge (OIC) has any doubt about the presence of people in the Pit, the OIC **must** search and secure the Pit before operating the Cyclotron or RF system.

2.0 QUALIFICATION

This procedure is performed by a trained person familiar with the normal Cyclotron operational practices and the normal configurations of the Cyclotron equipment.

This procedure is to be performed by a qualified radiation worker or Cyclotron Operator (a second radiation worker, operator, or a trainee, may accompany the qualified worker for safety or training purposes only.) Only people trained in this procedure may search and secure the Pit.

This procedure may be performed by the persons who have completed NSD1005 “Pit Search and Secure Procedure” training. The EH&S Training Reports database may be checked to find the names of the persons that have completed the required training for this procedure.

3.0 HAZARD REVIEW

The performance of this procedure should not subject personnel to increased hazards above

those associated with entering a controlled area. Upon entering controlled areas the searcher must follow the established facility safety practices.

4.0 PROCEDURE

4.1 Search and Secure Preparation:

4.1.1. Verify the Pit area is ready to be secured and all work in the Pit area has been completed.

4.1.2. Secure or verify the Cyclotron operation has been secured by having the OIC open the 12kV breaker.

4.1.3. Verify that the Cyclotron Radiation Safety Interlock System chain has control power at Interlock Panel A2111. It is essential that the lamp labeled SAFETY CHAIN control power be on to provide control power to enable completing the Pit search and secure procedure.

4.1.4. Prepare a Pit SAS checklist. The searcher will use the SAS checklist as an aide to the performance of the procedure. Complete the checklist as the procedure is performed and insert the completed checklist in the Cyclotron Operations Logbook. A Pit SAS checklist is shown in Attachment A.

4.1.4. Take a PIT key from the CONTROL ROOM TRANSFER KEYS panel in the Control Room.

4.2 Search and Secure the Pit:

To search and secure the Pit, proceed as follows:

4.2.1. Enter the Pit: At the west Pit door, review the Pit Radiation Survey form to identify areas with-in the Pit that exhibit measurable radiation levels.

4.2.2. Enter the Pit through the open west outer Pit door, and close it after you enter.

4.2.3. Proceed through the west access tunnel to the Pit. Close the inner west Pit door behind you.

NOTE

Both west outer and inner gates must be closed to operate the Pit search chain system.

4.2.4. Search the Pit: Search for any people. Ask any people in the Pit to leave. People could be working behind electronics racks, well out of site. Look all around for people working in the Inflector area, and on ladders. If anyone is found in the Pit, the search must start over return to section 4.2.1., after they have left.

4.2.5. Search for any unsafe condition that exists or that could impair the safe and proper operation of the Cyclotron. Correct any safety concerns or operational readiness concerns found. The search must start over after the problems have been corrected. Return to step 4.2.1.

4.2.6. Proceed to the east Pit access tunnel to the east door. Go through the door (holding it open) and check that the swing gate at the top of the ladder (in the Pump Room, above) is fully closed.

4.2.7. Re-enter the Pit, closing the east door behind you.

4.2.8. Proceed to the first search station at the north east corner of the pit. As you pass the inflector cage verify that the inflector cage is closed and latched, the inflector is fully inserted, the inflector HV cable is connected, and the inflector air is connected and blowing. Check that the inflector vacuum pump is on and using a flashlight check that the pump has sufficient oil in its reservoir.

4.2.9. At each of the two search stations:

1) Check that each RUN-SAFE switch is set to RUN;

2) Check that each amber beehive light glows, Replace defective lamps as they are found (the RUN-SAFE switch must be in RUN mode), restart the SAS if interrupted by defective parts replacement;

3) Press the PIT INSPECTION switch lamp, check that both upper PRImary and lower SECondary lamps glow;

4.2.10. Proceed to the second search station past the DPs to the south west corner of the Pit.

4.2.11. After passing the second Pit search station, move to the west access tunnel door (inner door). Press the timed DOOR BYPASS switch at the left of the inner door, open the door, and move out into the tunnel smartly and safely, immediately closing the door behind you.

NOTE

You have 10 seconds to get through the door and close it, or the PIT INSPECTION chain will drop, requiring you to repeat the procedure to here.

4.2.12. Move to the outer west gate.

4.2.13. Press the timed DOOR BYPASS switch at the left of the outer gate, open the gate, and move out of the tunnel smartly and safely, immediately closing the gate behind you.

NOTE

You have 10 seconds to get through the gate and close it, or the PIT INSPECTION chain will drop, requiring you to repeat the procedure to here.

4.2.14. Secure the Pit: At the PIT SEARCH COMPLETE panel (immediately outside the west outer Pit gate) press the PIT INSPECTION switch lamp. Verify that *both*: the PRImary PIT INSPECTION switch lamp *and* the SECondary PIT INSPECTION switch lamp glow.

4.2.15. Return the Pit key to the CONTROL ROOM TRANSFER KEY panel in the control room. Insert the key in the key switch labeled PIT, and turn the key to the full cw position.

4.2.16. Verify that the PIT portion of the Radiation Safety Chain Interlock Panel glow.

4.2.17. Record the time that the PIT SAS was completed and sign the entry in the Cyclotron Operation Logbook.

NOTE

If anyone must enter the Pit, the OIC **must** ensure that everyone entering the Pit actually leaves the Pit. If the OIC has any doubt about the presence of people in the Pit, then the OIC **must** search and secure the Pit before operating the Cyclotron.

5.0 RECORDS

Records generated by compliance with this procedure are to be in compliance with RPM, Section 1.18, Records Management. Records generated through implementation of this procedure consist of the entry in the Cyclotron Operations Logbook indicating the signature of the searcher and the time of the completion of the SAS. I n addition the completed SAS checklist is kept in the Cyclotron Operations Logbook. The Cyclotron Operations Logbook is maintained in the control room by the Operations Supervisor.

6.0 REVIEW OF PROCEDURE

Under the guidelines for DOE Order 420.2B, this procedure will be reviewed at least once every three years, or sooner if changes occur that may impact the appropriateness or implementation of this procedure.

REVISION HISTORY

11 July 1996: Updated and approved as V1.0 due to engineering changes in the Pit Search and Secure chain, and the addition of the redundant interlock chain in the Pit.

1 June 2006: 88-PRO-005 was updated and approved as V 2.0 to reflect current operating practices and implementation.

7.0 GLOSSARY

ALARA Policy: The LBL ALARA (As-Low-As Reasonably-Achievable) Policy for personal radiation exposure. For the Laboratory ALARA policy see LBL Publication 3000 Section 21.3: ALARA Program at Berkeley Lab.

SAFETY CHAIN INTERLOCK PANEL: The Cyclotron Radiation Safety Chain Interlock Panel located in the Control Room at rack A2111.

OIC: Operator-in-Charge

RF SYSTEM: The Radio Frequency System, the source of energy used to accelerate the ion beam inside the Cyclotron. RF energy creates the voltage on the dee electrode that accelerates injected ions and may accelerate stray ions (dark currents).

SEARCHER: A person qualified to execute this Procedure, usually the Cyclotron Operator in Charge or another qualified Cyclotron staff member, who will clear, search, and secure the Cyclotron Pit and record the fact in the Operation Logbook.

PIT INSPECTION SWITCH LAMP: These are two part switch lamps located at each search station. They have two internal lamps. The upper lamp indicates the status of the PRImary interlock chain; the lower lamp, the status of the SECondary interlock chain. Both should glow once the switch lamp is pressed (assuming the search station's RUN-SAFE switch is in a safe state). Failure of either PIT INSPECTION switch lamp to reset (indicated by either switch lamp *not glowing*), indicates there is a break in the inspection reset chain. The break is usually an open RUN-SAFE switch, an opened gate, or because someone has entered the Pit, nullifying this search: Clear the Pit and begin again.

8.0 REFERENCES

1. LBL Publication 3000: Health and Safety Manual, Section 21.
2. LBL Publication 3113, LBL Radiological Control Manual.
3. DOE Order: DOE O 420.2B, *Safety of Accelerator Facilities*

9.0 ATTACHMENT

Attachment A. Pit Search and Secure Checklist. Changes to the checklist do not warrant a revision of the procedure.

Attachment A
Pit Search and Secure Checklist

Initial what was completed. ND- Not Done NA- Not Applicable Page_____

Search and Secure Checklist Date:_____

	Vault	Pit	Tren	01/02	1	2	3	4	4A	4B	4C
Preparation											
Ask all personel to leave the area											
Search	Vault	Pit	Tren	01/02	1	2	3	4	4A	4B	4C
Enter area closing chain protected doors / gates behind you											
Search and ensure all people are out of the area											
Proceed around the area, press chain inspection lights											
Verify primary (up) & secondary (dn) inspection lights on											
Verify all area doors, hatches and gates are shut											
Verify "Run-Safe" switches are in the "Run" position											
Verify Amber beehive & emergency door open button glows											
Search the area for any unsafe conditions											
Search for any condition that will preclude safe operation											
Verify beam plug shielding is adequate & undisturbed											
Verify shielding bricks are in place in the escape ways.											
Ask experimenter about any temporary shielding.											
Verify beamline devices are working											
Resolve any problems encountered											
After problems are resolved begin SAS again											
Secure	Vault	Pit	Tren	01/02	1	2	3	4	4A	4B	4C
Exit area and close doors / gates behind you											
Return door key to control room											
Record	Vault	Pit	Tren	01/02	1	2	3	4	4A	4B	4C
Record SAS and sign entry in Control Room log book											